We have all witnessed it, whether it is on television or in person, in a race car, or not, we have all seen the damage a head-on collision causes. The force of these accidents can be immense, cars are completely destroyed, people are severally injured, and sometime even killed. One key component to prevent such devastation to race car drivers is the Head and Neck Support (HANS) device. It prevents a driver’s head from extending forward in case of an accident, to prevent terrible neck injuries and even death. While only recently used in racing, the HANS device has been around for a long time.

It was invented by Dr. Bob Hubbard in the mid-1980’s. Dr. Hubbard is a biomedical engineering professor at Michigan State University. The device is essentially a collar system that straps to a driver’s helmet and rests on his or her shoulders. These straps help redistribute forces generated by a head’s pendulum momentum. If these forces were not redistributed throughout the collar system, the body would suffer skull and neck injuries so severe that a driver could be killed. One incident of severe injury was seen in 2001 when Dale Earnhardt crashed tragically on the last lap of the Daytona 500.

In the crash, Earnhardt’s right rear quarter panel of his car touched the nose of Sterling Marlin’s car. This sent Earnhardt’s car into the wall head on at close to 160 miles per hour. This means that his immediate decelerated force was of 40 miles per hour and caused intense G-force to the car and Earnhardt’s body. Imagine an average person getting in his car to attend work in the morning. As soon as he backs out of his driveway, and he is sitting still on the roadway, another car rams him at 80 miles per hour. That would be the equivalency of Earnhardt’s accident. The force then ran through his body and throwing his head forward into the steering wheel. Earnhardt’s head smashed the metal steering wheel with such force that he smashed his skull in approximately the area of the occipital lobe, causing massive head trauma. Had Earnhardt been wearing a HANS device he would not have had such a forward motion.

There are plenty more incidents of the HANS device saving a drivers life. In 2000, Jimmie Johnson was racing at Watkins Glen International when his brakes failed going into turn 1. He crashed head on into the wall at 140 miles per hour. Without the HANS device this accident could have easily killed a driver. The HANS prevented his head from impacting the steering wheel as it had in Earnhardt’s accident. But, luckily for Johnson, he was using a HANS device. Without it, he would have been severely injured if not dead.

Not all situations could be prevented with the use of a HANS device. The HANS only prevents the head from having a forward momentum and breaking a person’s neck. The unsuitability of some cars makes using the HANS device an unnecessary safety tool. In these types of cars the HANS acts as some sort of a placebo. In the 2010 accident of Shane Hmiel, this was clearly seen. He was qualifying for a USAC race in Terre Haute, Indiana when he entered turn 3 and lost control of his car. His car proceeded to flip into the concrete barrier top first, smashing his roll cage. Hmiel suffered massive head trauma and is now paralyzed from him neck down. In this case the HANS device was nothing more than a placebo for actual safety. Because of the car being unsafe, the HANS device did nothing. His roll cage collapsed, and if that happens the HANS device means nothing. It would just look a lot safer if the driver has the device on.

So what does that mean? Will using a HANS device eventually become something drivers do just to make racing seem safe? Not entirely. Firstly, every major sanctioning body of auto racing in the United States and throughout the world mandates the use of a HANS device. A driver has to wear it to participate in the race event. Second, it really does work. In tests run by the FIA Institute, it was found that actual head motion was reduced by 44 percent, and the force and acceleration of the head and neck reduced by 86 percent and 68 percent, respectively. This means even enormous accidents are brought below the injury threshold for drivers. More drivers will survive with the use of the HANS device. It no longer is just a placebo safety measure to make racing seem safe. The HANS device is perhaps the most important safety device that has come along in motorsports.